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CURRENT LITERATURE

BOOK REVIEWS

Physiology and ecology

We take up Dr. CLEMENTS' new book[1] with favorable anticipations, ready to welcome a text of moderate size with the broad scope indicated by the title *Plant physiology and ecology.* The author tells us that the book is based upon his earlier *Research methods in ecology*, the manner of treatment being the same; i. e., first to consider the plant as an individual, establishing certain relations between the physical factors and its functions and form (physiology), and then to consider it as a member of a larger or smaller group of plants (ecology). "The proper task of physiology," says the author, "is the study of the external factors of the environment or habitat in which the plant lives, and of the activities and structures which these factors call forth. . . . . The sequence of study is consequently factor, function, form." So after selecting and describing some prominent factor—water, light, temperature, etc.—he proceeds to discuss its influence upon the various functions and organs.

Undoubtedly that method of treatment possesses marked advantages; but it may be seriously questioned whether our present knowledge is broad enough and exact enough to permit its successful use. And if it were, to write physiology in such a manner is peculiarly difficult. It requires thorough familiarity with the literature, especially that dealing with experimental morphology and irritability, clear conceptions of physical chemistry, and above all an instinctive avoidance of vague and inexact physiological cant. Certainly Dr. CLEMENTS' adoption of this method makes the physiological part of the book strikingly unconventional; the ecological part is less abnormal because ecology has proceeded from the first largely along such lines. And of the ecological part we have little to say, since it is essentially like that of the earlier book (reviewed in this journal, **40**:381. 1905).

Pedagogically the book leaves much to be desired. In the earlier sections the author wavers between textbook and manual; for beside the "experiments" in distinctive type (some of which are not experiments at all), the body of the text is partly subject-matter and partly directions to the instructor as to the management of his class, or to the student as to the materials and methods of his work.

In the very first chapter, on stimulus and response, the student is plunged into abstractions of which he can have no previous conception and regarding which he receives no adequate explanation. Thus, the tonic and stimulating action of external factors is discussed in a dozen lines on page 2 and nowhere else referred to. Distinctions the finest are drawn between normal and abnormal adjustment, adjustment and adaptation, growth and modification, that puzzle the reviewer; and it is hardly probable they would be more intelligible to the sophomore, for whom the book is intended.

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[1] CLEMENTS, F. E., Plant physiology and ecology. 8vo. pp. xv+315. *figs. 125*. New York: Henry Holt & Co. 1907.

Logically the arrangement of topics is sometimes peculiar. How is the student to comprehend the treatment of translocation and storage of food as an adjustment to light; and particularly in what sense can digestion, respiration, fermentation, the nutrition of non-green plants, growth, reproduction, pollen and pollination (treated at length), flowering, and fructification be looked upon as adjustments to temperature?

Dr. CLEMENTS is known as the proposer of many technical terms, of which few, fortunately, reappear in this book. But, what is even more confusing, he makes free to change the meaning of long-used terms. We had a pretty definite idea of what stimulus and response mean, but it does not fit when absorption, diffusion, transport, and transpiration are called responses to water stimuli. Imbibition is defined so as to include the entry of water into porous bodies. Cutinization is said not to coexist with epidermal hairs and is practically limited to xerophytes. The well-known actinometer masquerades as a photometer; heliotropic is distinguished from phototropic; chemosynthesis would never be recognized by the man who introduced the term; rootstalk, a word unknown to dictionaries, replaces the Anglo-Saxon rootstock. Aphototropic must surely be a typographic error, but nyct*o*tropic is doubtless an emendation. Reaction time and perception time have new and confusing definitions; but presentation time does not appear at all.

One serious danger inheres in Dr. CLEMENTS' method; there is a tendency to ascribe changes of function and form which have a very complex causation to a particular factor. One has only to examine the table of contents to find illustrations of this and the pages abound in examples. The offhand way in which some of the most elusive problems are settled by referring them to simple causes is appalling. The cause of cell division, the nature of polarity, the relation of turgor to growth, the mechanics of stomata are a few cases which the judge as it were dismisses with costs!

Many a pitfall, too, awaits the thoughtless in "explanations" which are merely a form of words that only cloak our ignorance. Absorption is "an inherent property of protoplasm;" "the need for the water of absorption increases toward the fibrovascular bundles," and "in similar fashion the demand for food materials increases toward the outer layers," so that "the general direction [of movement] is determined by these two *facts*" (sic?); the "stability of a species" prevents its modification in a new habitat—these are a few examples of meaningless phrases.

For the adopted mode of presentation an acquaintance with recent work is a *sine qua non.* Yet some statements have a curiously antique flavor. PRINGSHEIM'S old screen theory of chlorophyll appears on one page and on the opposite one the modern theory is stated, but no decision as to their merits is reported. The amount of CO_2 in the air still appears as .04 per cent, and the starch formula as $C_6H_{10}O_5$. The work of two decades on solutions and osmosis is overlooked, for its bearing on the entrance of water, salts, and gases and on the movement of water and foods scarcely appears. The great advances in the last five years in the knowledge of perception, perceptive regions, and the interrelations of reactions find no reflection in this book, though they belong to its very essence.

Dr. CLEMENTS set himself a very difficult task; perhaps an impossible one, if we do not mistake the trend of recent study. That must be allowed for. Our main criticism, however, is not upon the choice of material for a brief treatise; it is against the attitude of mind that can tolerate vague explanations and invalid reasoning, and against a treatment of fundamental topics which is ineffective and not in accord with present knowledge.—C. R. B.

Jost's Plant physiology

When we reviewed this book in its original German,[2] we expressed the opinion that it was "easily the best work on plant physiology in any language, for the general student." Further use of it has confirmed this opinion, though it has at the same time uncovered some weaknesses that did not appear on the surface. It still remains as adequate a presentation of the fundamental features of plant activity as is likely to be made by any one author. Though it lacks the suggestiveness and comprehensiveness of PFEFFER, and can by no means replace that indispensable work, its clear and picturesque style adapts it better to the advanced student and teacher. Our hope that it would be translated into English has just been fulfilled. The Clarendon Press secured the right of translation and Professor HARVEY GIBSON, of the University of Liverpool, is responsible for the work.[3]

There has been no editing of the author by the translator. Even the index is a translation. Dr. JOST himself has added some notes and embodied some corrections; but these are relatively few and brief, and might well have been a more marked feature of the English edition.

A literal translation was the aim, says the preface, but that certainly has not been attained. It is not difficult to find passages where wholly gratuitous changes have been made, qualifiers added or omitted, or variant expressions used, that leave the phrase far from a literal translation. For example: "hochstens ganz gelegentlich musste erwähnt werden . . . ." is rendered "we drew special attention to the fact . . . ." when the fact *was* only incidentally mentioned; and "wachstumsfördernde Wirkung" appears as "stimulating effects," with growth

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[2] BOT. GAZETTE 37:390. 1904.

[3] JOST, LUDWIG, Lectures on plant physiology. Authorized English translation by R. J. HARVEY GIBSON. Imp. 8vo. pp. xiv+564. *figs. 172.* Oxford: Clarendon Press. 1907. Cloth 21 *sh.*, morocco 24 *sh.*